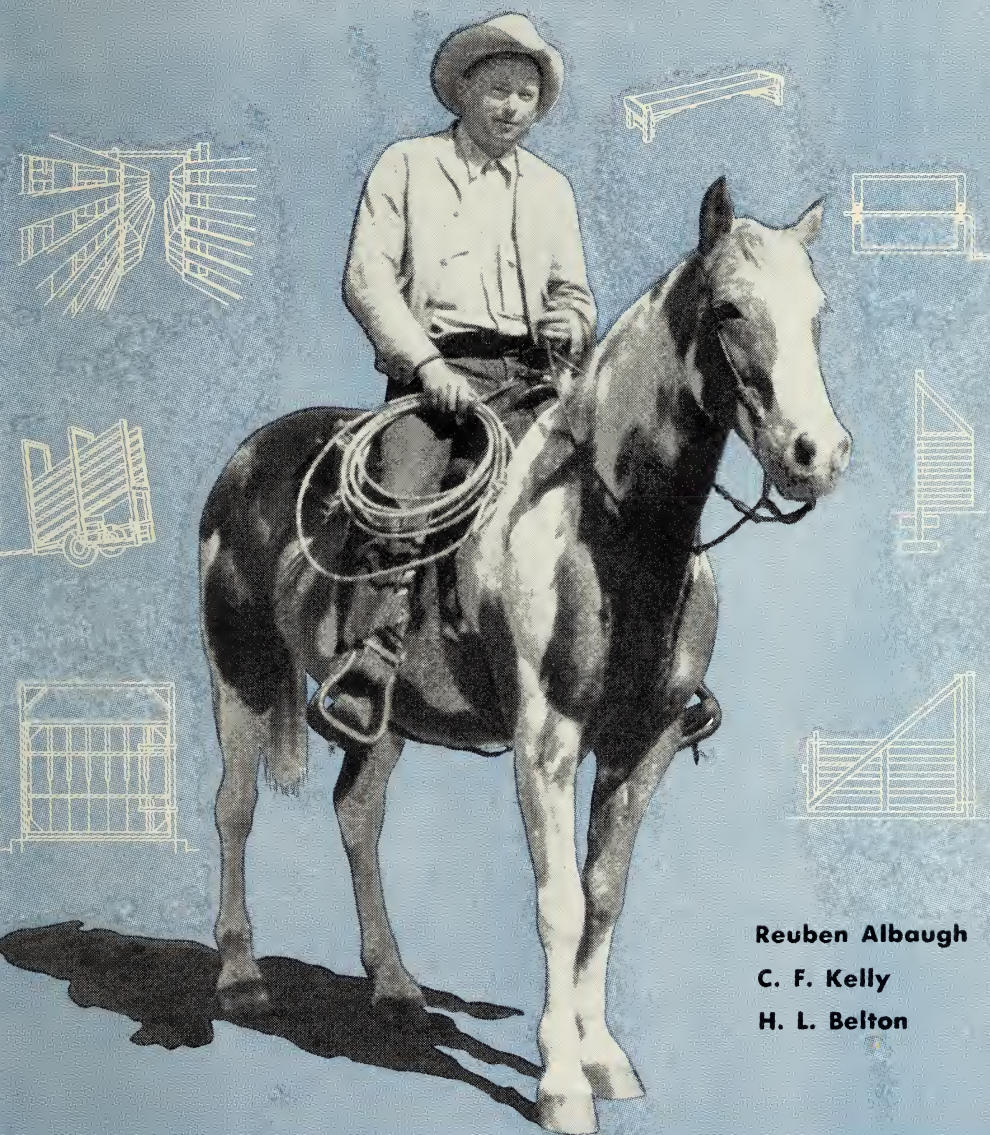




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BEEF HANDLING and FEEDING EQUIPMENT



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CALIFORNIA AGRICULTURAL
Experiment Station
Extension Service

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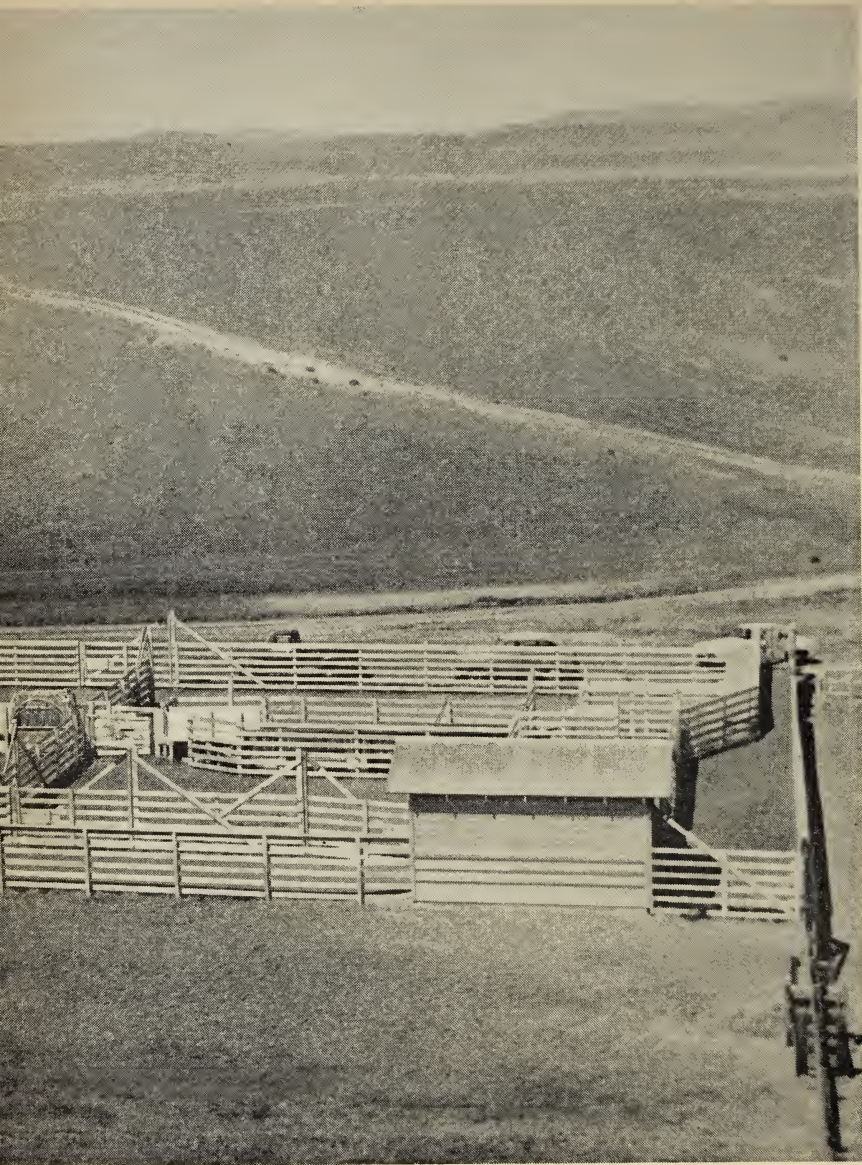
The cover photo shows Ki Silacci, prominent cattleman of Salinas, California, on his top cow horse, with good practical working equipment for handling cattle.



Here is
such a
dr

UNFOLD THIS SHEET FOR FULL VIEW: SEE PLAN ON BACK





a good corral for handling cattle. It includes all of the necessary equipment, arranged in way as to be easy on both men and animals. Note that it is located on a slope to give better drainage. In this corral (158 x 102 feet) 300 head of cattle can be worked at one time.

BEEF HANDLING and FEEDING EQUIPMENT

REUBEN ALBAUGH

C. F. KELLY

H. L. BELTON

WHEN PRICES of cattle are favorable to the cattleman it is wise to spend money in constructing or remodeling equipment for handling and feeding his stock.

Well-planned corrals and other devices make handling of stock easier, save labor, and most of all cut shrinkage to a minimum. Money spent on good handling equipment is one of the best investments a cattleman can make. As in building a house, there is no one plan for equipment such as corrals, scales, chutes, and dipping vats that would be best for all ranches. However, certain features and construction details of a general over-all plan might be usable on any ranch. A good, practical set of corrals and equipment should afford facilities for branding, dehorning, loading, unloading, weighing, dipping, parting, and working cattle. Drinking water should also be made available. In certain areas shade and some weather shelters are desirable. Corrals and other equipment should be strongly built and painted to preserve the material. They should not only be


built for convenience, but should be laid out and planned for economy and serviceability.

First build your holding corral

In planning a corral, choose if possible an area that is well drained and on a soil of sandy texture. It should be in the center of ranch operations to reduce distance in movement of stock.

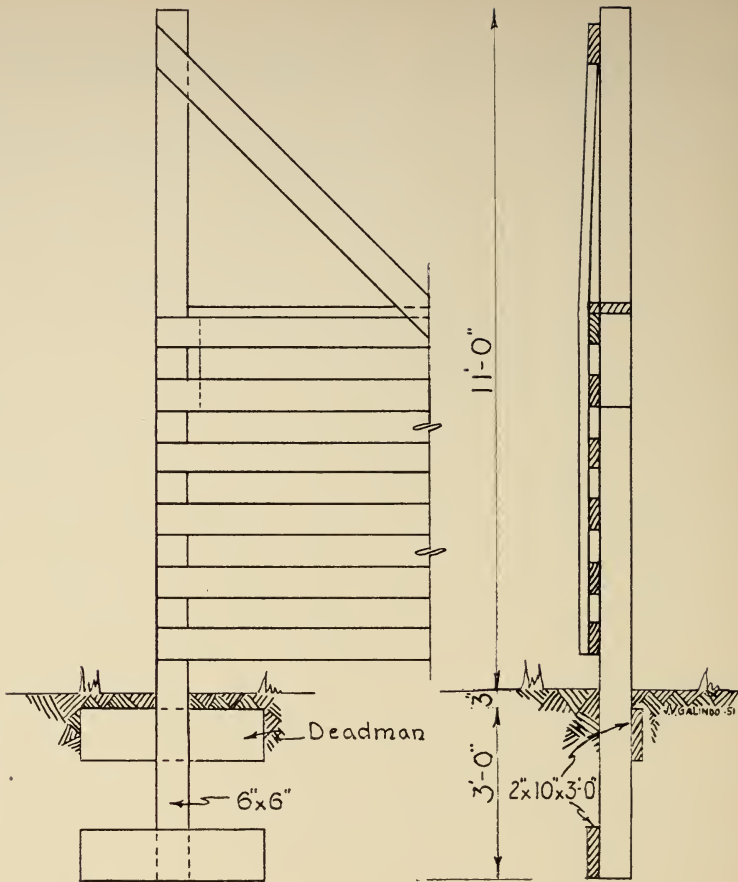
One of the most important considerations is the loading chute. This must be so located that large trucks and trailers can easily reach it. After the location of the loading chute has been established, you can build the rest of the corral around it.

We suggest that 2" x 6" unsurfaced lumber be used for fencing. Double construction on the insides of corrals is recommended so that the outside of the posts will not damage and bruise the cattle. This also makes the corral stronger and more durable. The fence boards may be fastened in place with 20d nails, but $\frac{3}{8}$ " or $\frac{1}{2}$ " bolts are preferred.



Here is a plan of the corral shown on the opposite side of the fold-out. The corral is arranged in such a way that cattle can move toward the loading chute when being worked through the branding chute and dipping vat. Gates open to form "wings" with chutes; the scale is located out of the direct line of traffic.

Posts for a 5-foot corral



Gate posts and "deadmen" should be made of redwood, or other decay-resistant material. The top piece is nailed on outside of post, just below the ground surface; bottom pieces on the inside, so that nails do not carry the pressure.

Use posts of redwood, cedar, or some other decay-resistant wood, set 6 feet apart, and at least $2\frac{1}{2}$ feet in the ground. Set corner and gate posts 3 or 4 feet deep. Solid tamping of posts is one of the most important features in constructing corrals for cattle.

To preserve the posts we recommend that you treat them with a 5 per cent solution of Pentachlorophenol. This material is sold under trade names; one is Perma-wood. It costs about \$.05 per post.

It is a good idea to reinforce large posts used to swing gates on by nailing to the posts two $2'' \times 10'' \times 3'-0''$ redwood pieces, as shown above, to act as "deadmen" below the ground. In addition to the "deadmen" it may be desirable to tie the tops of the gate posts together with a 2×6 .

We do not recommend setting posts in concrete. They are more likely to rot, and if broken off they are difficult to replace.

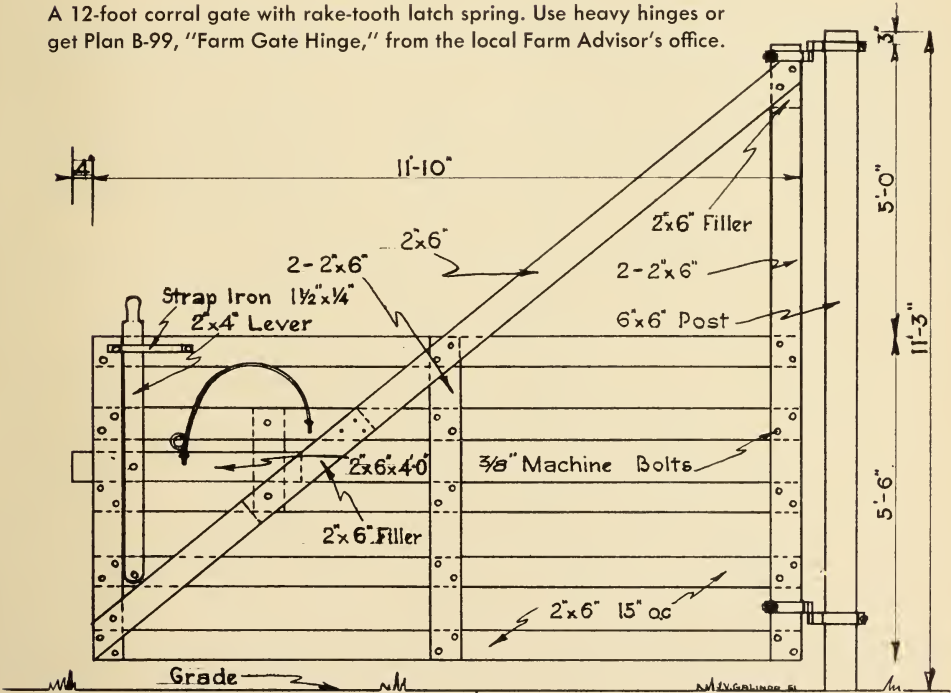
Gates are very important

There is an old saying that you cannot have too many good gates, and that the efficiency of any ranch is judged by the condition of its gates and the ease with which they operate. It is usually best to place gates in the corners of corrals or other convenient places where it is more or less natural for cattle to go. Wherever possible, the gates should open in the direction in which the cattle are being driven. If practical, gates should be swung so as to make a "wing" with chute corrals or scales into which the cattle are to be moved. They should be built out of the same material as that of the corrals, and both bolts and nails should be used in their construction. Build the hinge end of the gate out of two 2 x 6's in order to give sufficient surface for the hinge.

Parting gates may or may not be placed in a chute. Some cowmen prefer to run cattle through a chute and part them with a two-way gate. Some may even want to make arrangements to cut them three ways. Our plan (opposite page 1) calls for a parting gate at the end of the squeeze. It is so placed that cattle can be cut two ways. Other cattlemen prefer to part or sort their cattle in corrals, believing that it is easier on the cattle and causes less bruising and shrinkage.

Of the many different types of gates and latches, the one below has been found satisfactory on a number of ranches and is cheap and easy to make. A dump-rake tooth acts as a spring to keep the gate from being opened by the cattle.

A 12-foot corral gate with rake-tooth latch spring. Use heavy hinges or get Plan B-99, "Farm Gate Hinge," from the local Farm Advisor's office.



Branding chutes

The cattle-branding chute shown below is more or less a dual-purpose chute. Used for branding, spraying, or parting cattle, it is so constructed that both small and large cattle can be worked through the same chute without the smaller animals turning around and the larger ones becoming lodged in it.

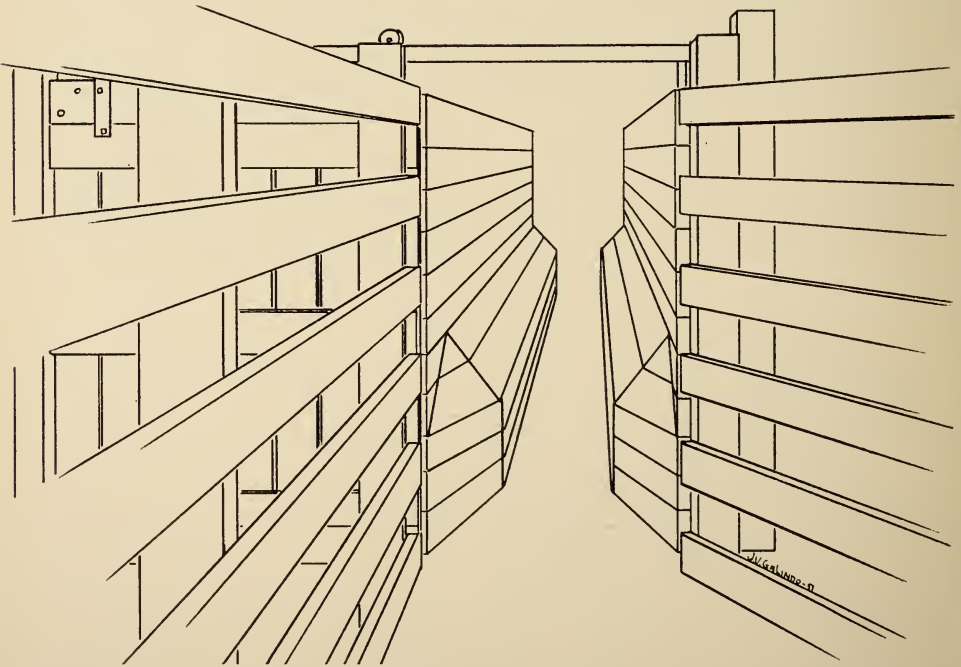
Sides are solid. The first 24" of the height of this chute is 17" wide, the remainder widening to 33", as shown in the detail at the top of page 5, opposite. For economical construction, five 2 x 6's alternating with 1 x 6's in the spaces may be used. The floor should be concrete, with a broomed finish.

Brace the chutes by nailing 2 x 10's in the ground six inches below the bottom of the chute from post to post. It is not desirable to brace the posts by nailing cross ties across the top. This construction interferes with operations such as spraying. Details for constructing these

cross ties at the bottom of the posts are shown in the plan at the top of page 5, with an alternate method, using a concrete cross beam, detailed directly below it.

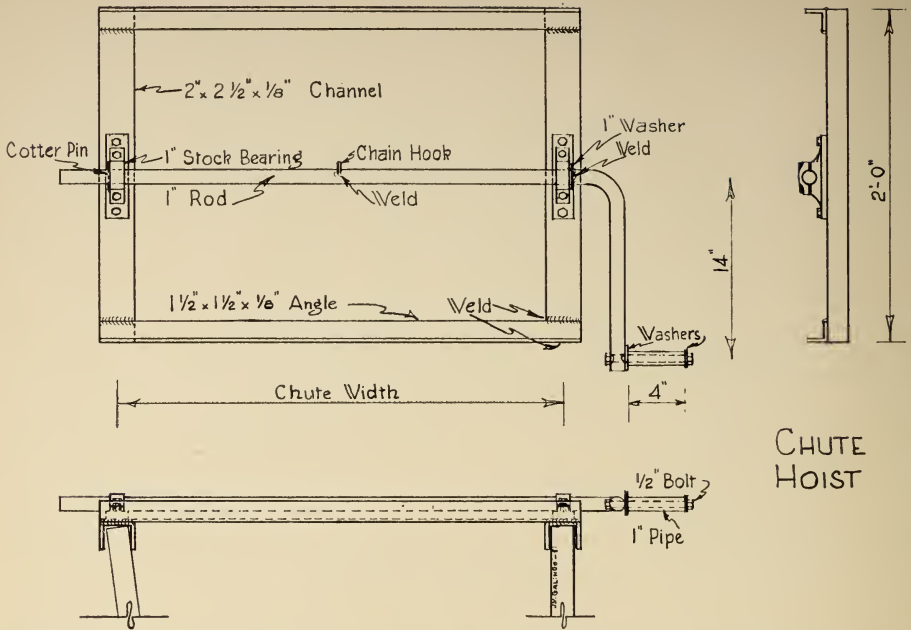
Walk-ways are desirable on any kind of chute. We recommend that sliding gates be constructed at either end of the branding chute by crossing 1 x 6's and nailing them well. Detail for this construction is also shown in the sketch.

Some cattlemen like to build curved chutes, thinking the cattle will enter them more readily. This type is more difficult to construct and is not so convenient to incorporate in the general corral plan. Most cattle chutes are straight. Cattle usually want to return to the area from which they came; chutes located so that cattle can be driven into them in this direction are desirable. A hoist for raising cattle which may go down in the chute is shown on page 6.



Branding chute, looking down the entrance end. Note flared ends near the bottom to guide cattle into the chute and prevent bruising. A squeeze can be set up at the far end.

Making a portable hoist . . .



Plan for making a portable hoist for raising cattle that go down in the chute. The distance between the channels should be the same as the width of the chute.

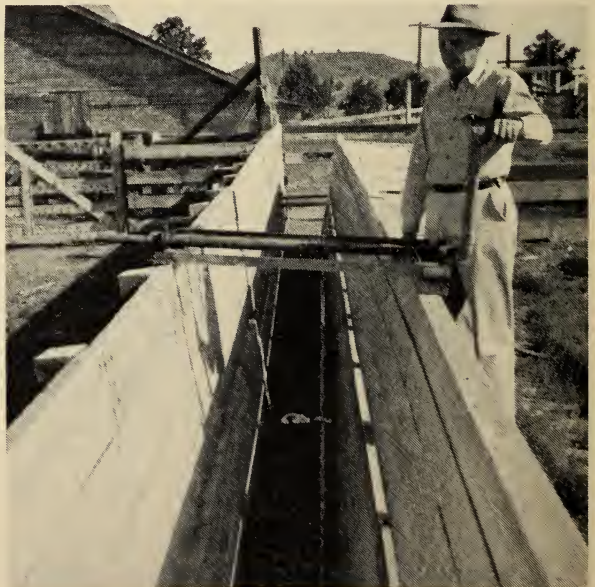


Photo of the portable hoist, plans for which are shown above.

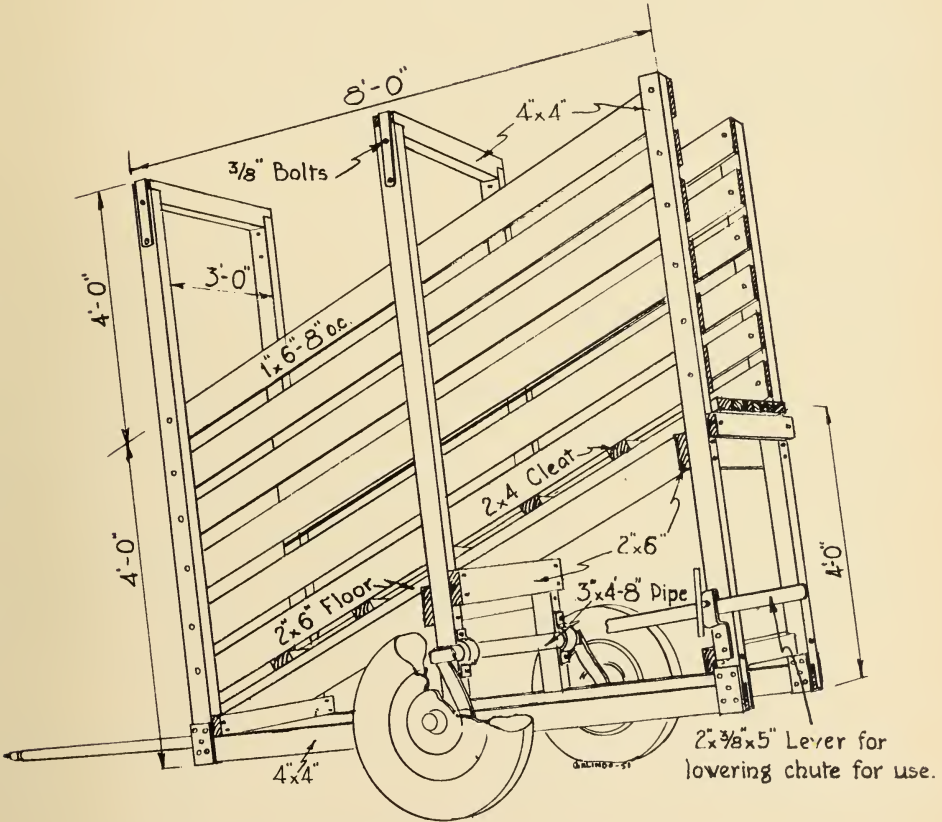
and a portable loading chute

Since most cattle are transported by truck it may be necessary on many ranches to have a portable loading chute. Such a chute is convenient because it can be hauled from field to field and can be used for loading and unloading in temporary corrals, such as in beet fields and permanent pastures.

The portable loading chute shown here can easily be hauled behind a truck or trailer and can be operated by one man. It is mounted on retractable rubber-tired wheels. The specifications below show how the tongue is designed to telescope back out of the way when the chute is lowered for use.



Photo of the portable loading chute, plans for which are shown below.



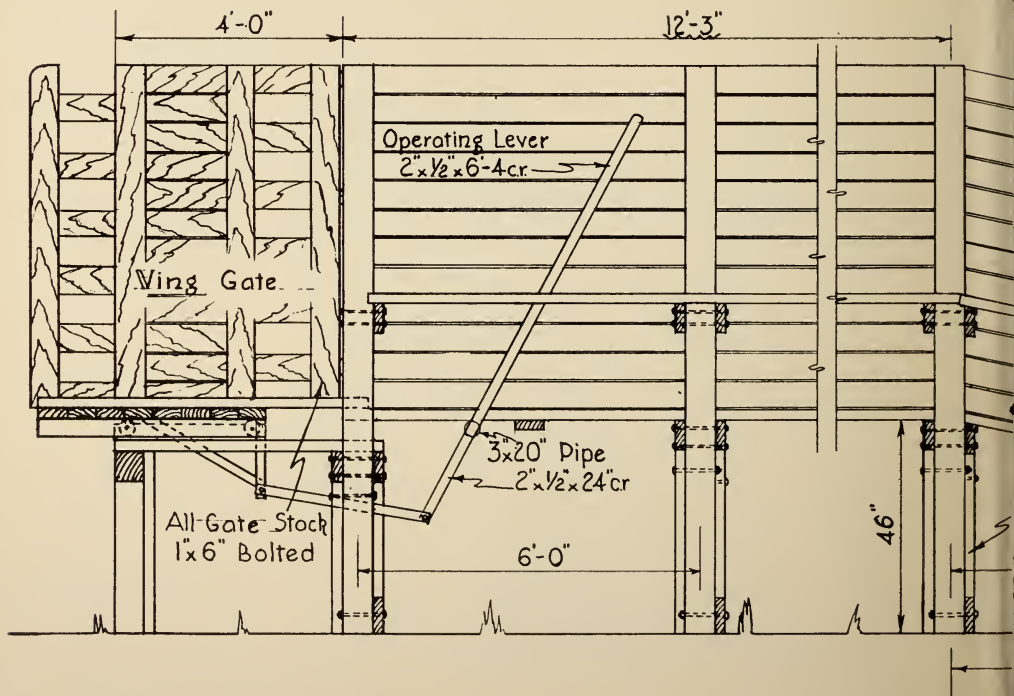
Plan for building a portable loading chute that may be towed behind a truck.

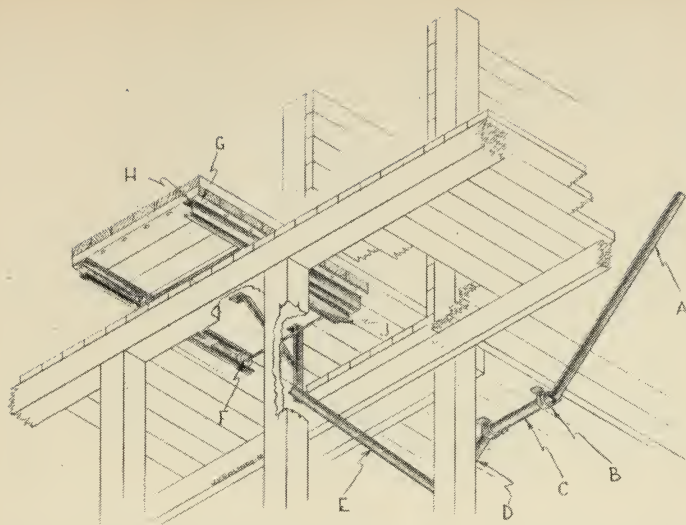
Loading chute with sliding gangplank

Locate your loading chute so that both large and small trucks and trailers can reach it conveniently any time of the year. A plan for a strong, well-constructed loading chute with 16-inch gangplank movement is shown below. A very desirable feature of this plan, for adjusting the end of the chute that comes into contact with the truck, is shown in detail on the opposite page. It is also important for easy loading to have the loading chute long enough so that there is a gradual incline from the corral to the trucks.

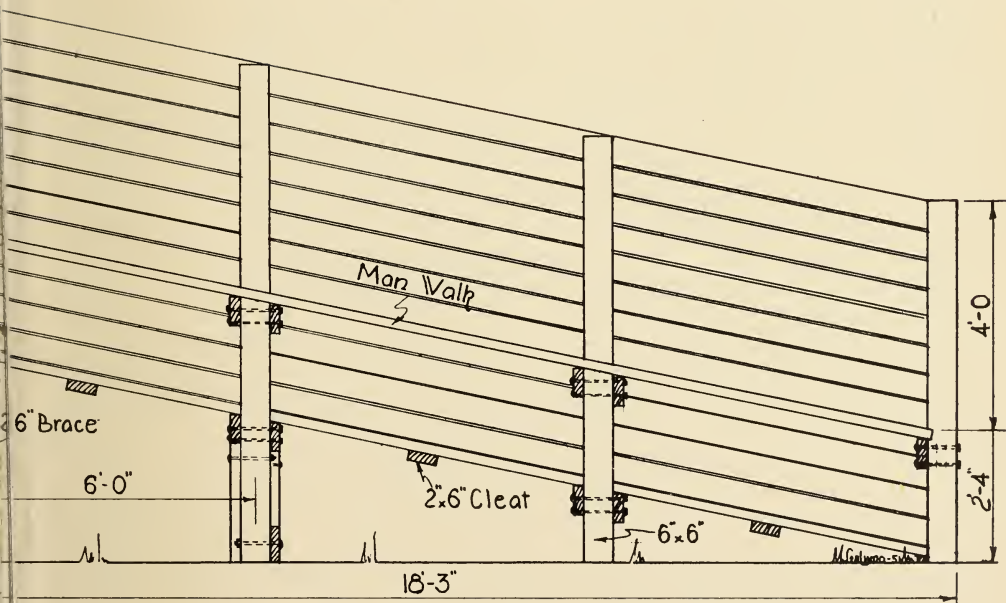
Reinforce the loading chute by tying the posts at the bottom rather than at the top. The width should be 3 feet in the clear. Construct walk-ways on both sides of the chute. If they are put on one side only, the left side is the more convenient. Where corrals and equipment are constructed on land that is rather stony, in which setting posts is difficult, chutes can be successfully built on top of the ground by the method illustrated on page 5. Concrete sleepers placed every six feet will keep these chutes in place.

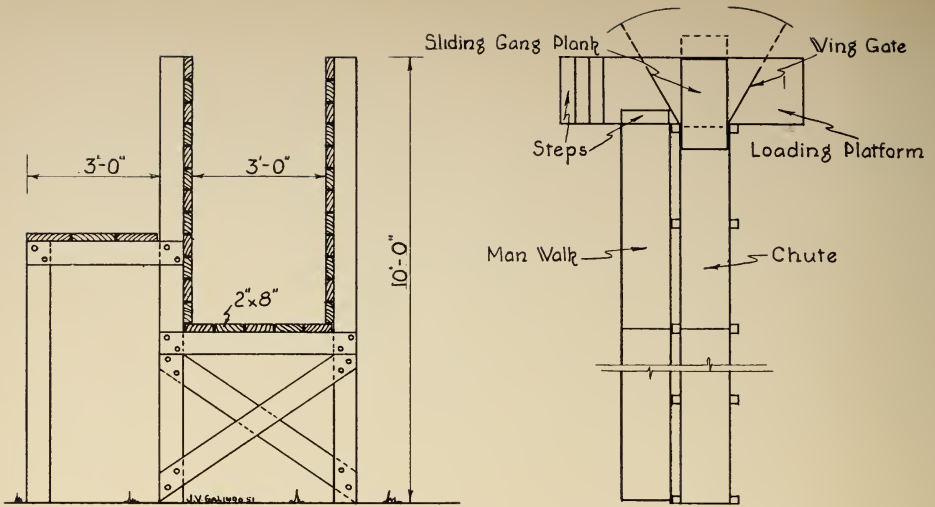
Construction details of loading chute. For details of man walk, see plans at top of page 10.





Lever A, welded to 2" shaft C which turns in bearings B, moves gang plank back and forth on rollers F through linkage of pieces D and E. Rollers F, 2½" in diameter, turn on shafts which are supported by angle J, 4" x 4" x ¼". This angle is bolted securely to the wood platform. The roller tracks H are of 3" x 1½" x 1½" x ¼" channels welded to the steel pieces G (¼" x 3" x 4'-0" cold rolled steel). These pieces are bolted to the moving platform. Wing gates are here omitted for clearness.





Details of man walk for loading chute shown on preceding page.

Scales are important and need good care

Locate scales so that cattle movement is cut to a minimum. Scales should be of the pit type; build the pit of concrete. Make the pen slightly smaller than the scale platform so that it rests entirely upon it—in other words, the pen becomes part of the weighing platform. Where this is not the case, accurate weighing is impossible.

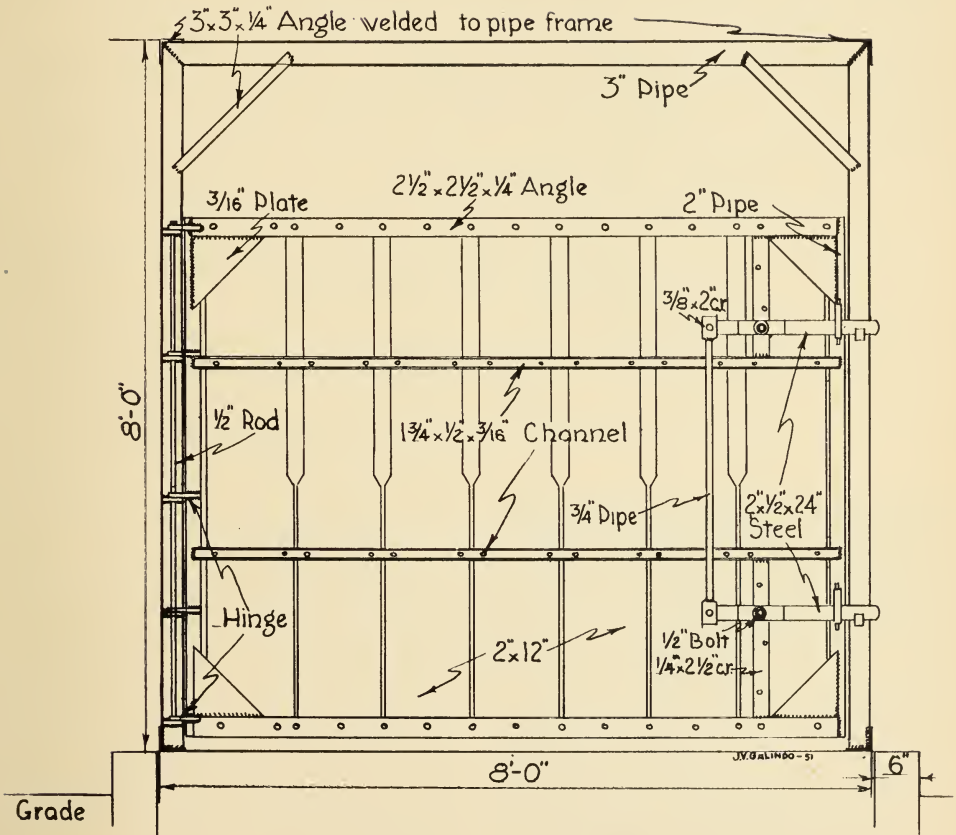
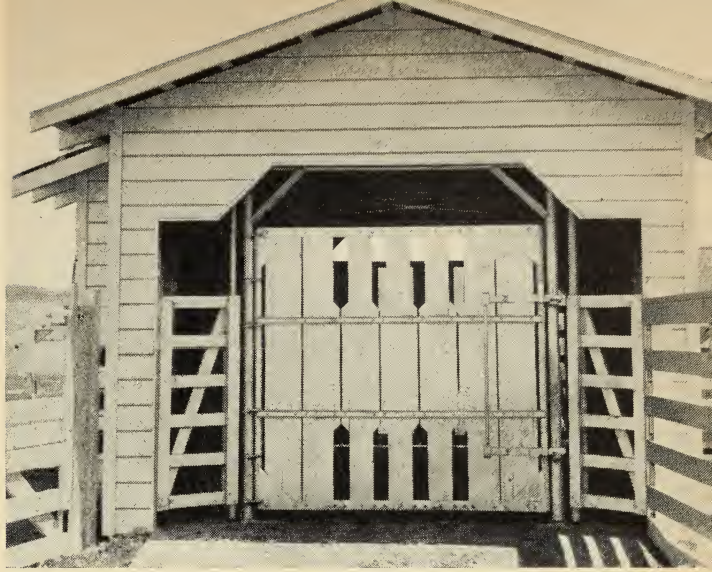
On some ranches it is desirable to remove the scale rack from the scale platform in order to weigh hay or grain on a truck or wagon. This can be accomplished by placing the scale rack on a small track so that it can be removed when necessary. In this case the scale house or shelter must be high enough to provide clearance for the loaded vehicles. If you do not wish to remove the scale rack, bolt it solidly to the platform. The type of construction recommended

for the scale rack is similar to that of a rack on a cattle truck.

Scales work more satisfactorily if they have some kind of housing or shelter over them (see page 11). Such housing should be large enough for working space around the scales. The latch for the scale gate recommended here has been found workable and practical. Detail of a rack incorporating this latch is shown on the opposite page.

Scales are one of the most important pieces of equipment in the cattle business, and too much stress cannot be placed upon their proper care, treatment, and location. It is very desirable to have them located so that cattle can be worked in the adjoining corrals without passing over the scales. The only time cattle should cross the scales is when they are being weighed.

This scale house was built over the scale and rack. One disadvantage of such a house is that the scale rack cannot be removed for weighing trucks or other large equipment.



Scale rack and gate details. The 3" x 3" x 1/4" angles are welded or bolted to the scale bed and the 3" pipe rack frame is welded to these. The double latch insures rigidity.

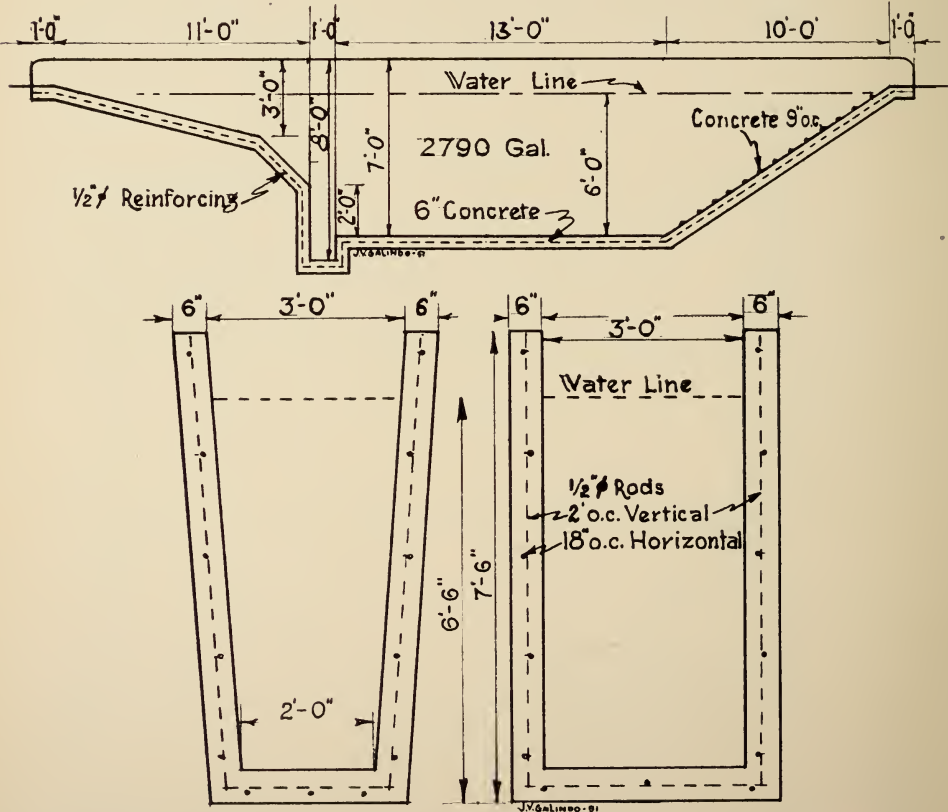
A dipping vat may be necessary

On some cattle ranches dipping vats may be needed to control external parasites, especially lice and ticks. The plan for the vat below features a wade-in, which conserves dipping material and makes it easier to drive cattle into the dip. If the wade-in is eliminated, a 30-foot vat is large enough for most ranches, although it can be made larger if necessary. The plan shows longitudinal and alternate cross sections of a concrete dipping vat. The sloping-side type will save a little liquid.

The concrete mixture recommended is 1 sack of cement to 2¼ cu. ft. of sand and 3 cu. ft. of gravel. In order to get waterproof concrete the water used

should be kept to a minimum—not more than 5 gal. per sack of cement for this mix, if the sand is moist. (For more detailed information on waterproof concrete to be used in construction, write the Portland Cement Information Bureau, 564 Market St., San Francisco, Calif.)

A waterproofing paint may also be applied to the vat after it is constructed. One-half inch steel rods placed 18" on centers horizontally and 24" vertically are recommended for reinforcing the concrete. Approximately 10 cu. yd. of ready-mix concrete will be needed or, if the mixing is done on the job, 60 sacks of cement, 7 cu. yd. of sand, and 8 cu.

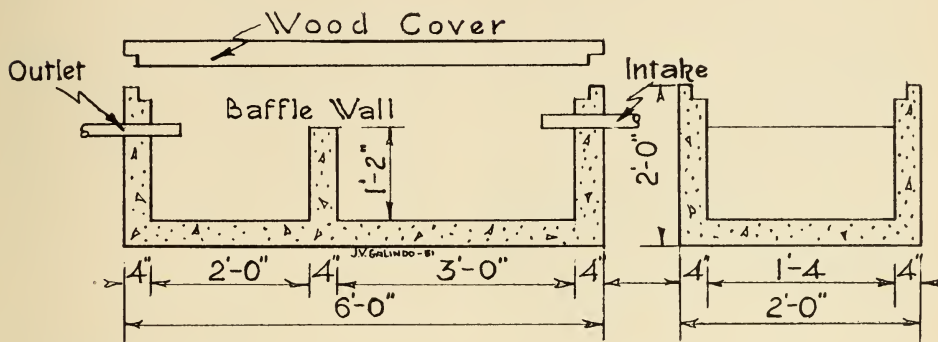


Longitudinal and alternate cross sections of a concrete dipping vat. The sloping-side type (left) will save a little liquid.

yd. of gravel (largest size 1½-inch). A total of 525 pounds of the ½-inch reinforcing steel will be necessary.

In constructing the vat, pour the walls first and the bottom as soon as possible afterwards. The drain corral in connection with the dipping vat is arranged so as to return the unused liquid to the main vat. The catch basin which can be seen in

this sketch may be constructed in the line between the drain corral and dipping vat to keep the dip clean by removing debris and to prevent as much waste as possible. This should be installed in the return line from the drain floor to the dipping vat. The lumber used in making forms for the vat can later be used as fencing material for the corrals.



A catch or settling basin for removing debris from the dip. This may be installed in the return line from the drain floor to the dipping vat.

A branding-iron stove

A stove to heat branding irons that is easy to make and inexpensive to operate has been developed by Julius Trescony, a cattleman of San Lucas, Monterey County, California. It is pictured below.

The stove consists of an oil drum with one end left open. About the middle of the drum on one side a 12" x 12" opening is made with an acetylene torch. The lower part of the drum is not cut away; it serves to support the branding iron.

When the irons are to be heated, a wood fire is built in the bottom of the drum. Branding irons are inserted in the opening. Such a stove heats the irons quickly and evenly and at the same time reduces the fire hazard.

A branding-iron stove, made from an old oil drum, is inexpensive and efficient.

In the illustration Trescony is displaying the oldest registered cattle brand in continuous use in California. It was first used by his grandfather in 1842 and is called Spanish A.T.



PLAN YOUR FEED YARD CAREFULLY

Keep these factors in mind: (1) labor efficiency, (2) good drainage, (3) protection of feed from weather, and (4) protection of animals from weather.

The labor cost of feeding cattle is second only to the cost of feed. In the feed corral arrangements must be made for both getting the feed to the animals and hauling away the manure with a minimum of labor. Gates and the yards themselves should be large enough so that you can operate mechanical equipment for cleaning.

If feed mangers are located along the sides of the corrals they can be filled from the outside, without your entering the yard. Otherwise, stationary or portable bunks may be arranged inside the yard. In either case, access to the bunks by trucks or teams must be maintained in all weather. A concrete slab about 12 feet wide may be constructed the full length of feeding mangers. This structure keeps cattle out of mud and facilitates cleaning.

Whenever possible the feed yard should be placed on a slope with natural drainage away from the lot. If this is not feasible, construct mounds of dirt in corrals away from the feed bunks. This will afford a place for cattle to lie down. If there is a choice, the yard should be

run across the slope of a hill so that the feed road and mangers will be on the high side. Also, the shorter the distance in the direction of the slope the better the drainage.

Although pavement is expensive, in some cases it may pay to have a strip of concrete 10 or 12 feet wide along the feed mangers. Harvey McDougal, feeder at Collinsville, California, has found that redwood 2" x 4"s placed on edge, and extending back from the manger 20 feet, will keep the cattle out of the mud and serve as a place for them to lie down when the feed lot is very muddy. The 2" x 4"s should have a slope of 1 foot in 10 feet away from the mangers. In cleaning this type of manger apron, attach a piece of rubber to the bulldozer blade to protect the 2" x 4"s. "Black-top" paving will not stand up for long under continuous use by cattle but makes a suitable road for the feed trucks.

Allow about 200 sq. ft. of corral space per animal unit. One hundred fifty head is about the maximum number of cattle that can be successfully fed in one lot. Smaller numbers per lot are often more desirable. Cattle should be sorted for feeding on the basis of grade, size, sex, and whether horned or dehorned.



General view of a feed yard. Mound of earth in the background provides a dry place for cattle to lie down.

Make strong fences

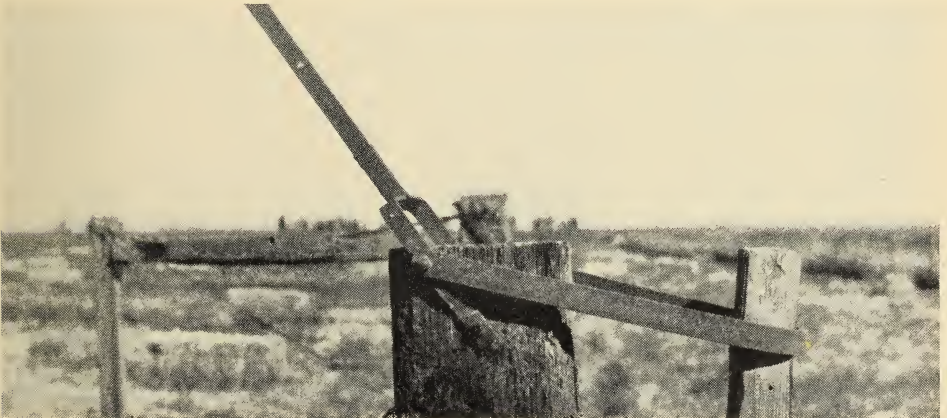
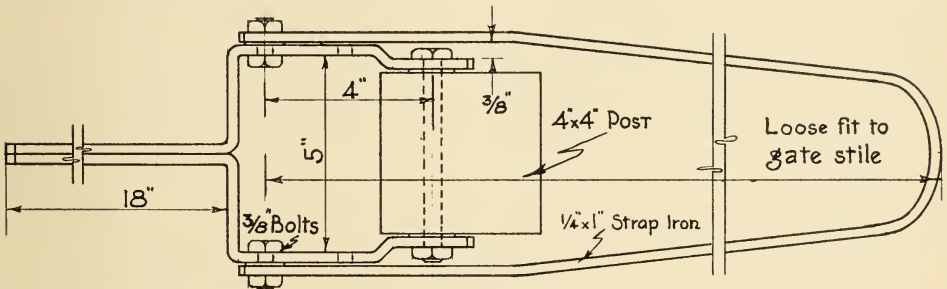
The fence for a feeding corral can be either wood or wire. It should be at least 5½ feet high with the posts set 8 feet apart. Suitable lumber for corrals is 2" x 6" spaced about 6 inches apart. These boards can be either nailed or bolted to the posts.

A good gate hinge

The gate hinge shown here is simple and economical. It is composed of the ends of two automobile springs. A ¾-inch iron rod passes through the holes in these two springs to make the gate secure. In order to drill holes in this hinge it will be necessary to heat the metal and allow it to cool slowly. The original material is very hard, making it impossible to drill a hole in it without reducing the temper.



A simple gate fastener



This gate fastener, for which a drawing is shown above, is simple to make and is very effective when used on wire gates.

Feed mangers and feed bunks

The requirements of a good feed bunk for beef cattle are strength, tightness, and correct shape and proportions. Where the animals have access to only one side of a manger, allow about $2\frac{1}{2}$ feet for dehorned animals, $3\frac{1}{2}$ for horned animals, and about 2 feet for calves.

A good type of manger for feeding hay along the side of the lot is illustrated at the bottom of the page. It is supported on the corral posts spaced 6 feet apart, and the front or side next to the animals is made of three $2'' \times 8''$ s. No bottom is used, the feed resting on the ground, or on concrete if the lot is paved. The height of the guard rail, to keep the cattle out of the manger, should be made adjustable from $1'-6''$ to $3'-0''$ above the manger front by means of holes in the line posts, to adjust quickly to the growth of the animals.

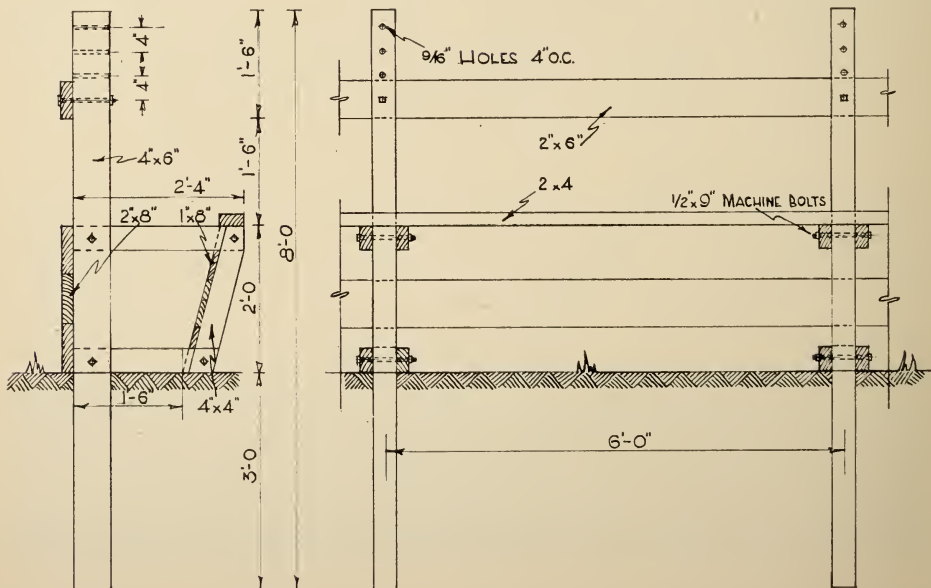
A manger of the same general type appears at the top of page 17, but here a backboard is added to prevent feed being thrown forward, and the guard

rail is replaced by a $\frac{1}{2}''$ steel cable running through holes in the line posts.

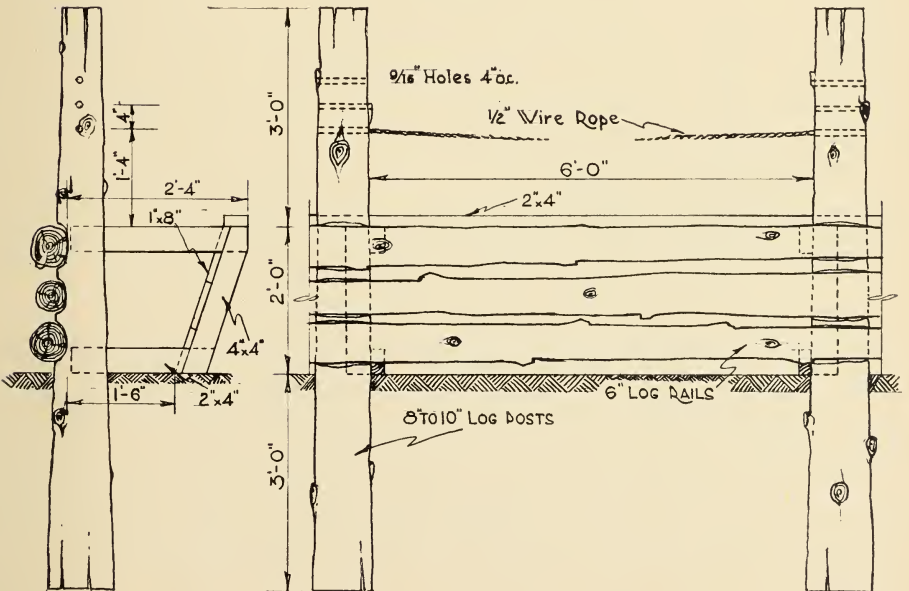
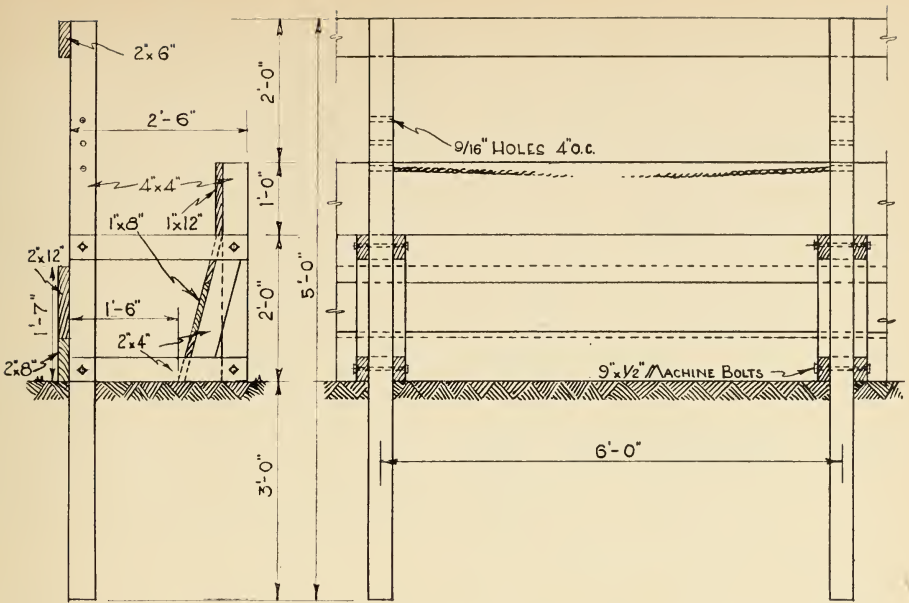
If log rails are available they can be used for a manger as shown in the plan at the bottom of the page opposite. The poles should be peeled, and if flattened on the side next to the line posts can be nailed in place with 60d spikes, or held with a wrapping of heavy, smooth wire.

A type of manger well suited for mechanical feeding of mixed chopped feed from a truck with auger is shown at the top of page 18. The bottom of the manger is made of sheets of galvanized metal $36''$ wide and as long as can be obtained. There are no obstructions to the free passage of the truck auger, and the bottom is smooth and easily kept clean. Fasten the sheets to the wooden rails with large-headed roofing nails.

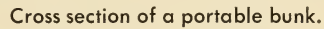
A satisfactory kind of manger for barn feeding of concentrates to young stock is also shown. The backboard prevents throwing feed forward. The $\frac{1}{2}$ -inch cable can be replaced by a $2'' \times 6''$ if desired.



This manger may be attached to the outside of the feed yard and has an adjustable guard rail.



It takes about 20 minutes to load the trailer, which is then unloaded by 4 endless chains equipped with angle-iron cleats placed every 4 feet. The cleats are 1½ inches high. These endless chains operate from a power take-off from the tractor. The wheels on the trailer are air-



[19]

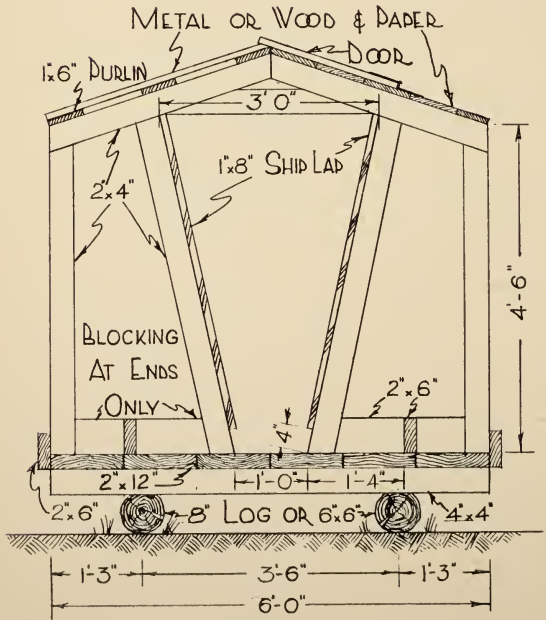
Self-feeders save labor

Self-feeding of concentrates and chopped hay is practical and a labor saver, especially in range feeding or in connection with irrigated pastures. The feeder shown directly below is suitable for feeding cottonseed meal salt mix on the range. It has a capacity of 9 cubic feet per foot of feeder, or about 360 lbs. per foot, assuming feed weighing 40 lbs. per cubic foot. A 10-foot feeder will hold 3,600 pounds of feed. Feeders of this type should be constructed to allow about 6 inches of space for each animal. Such feeders are usually placed about one mile apart on the range and **always near an ample supply of water.**

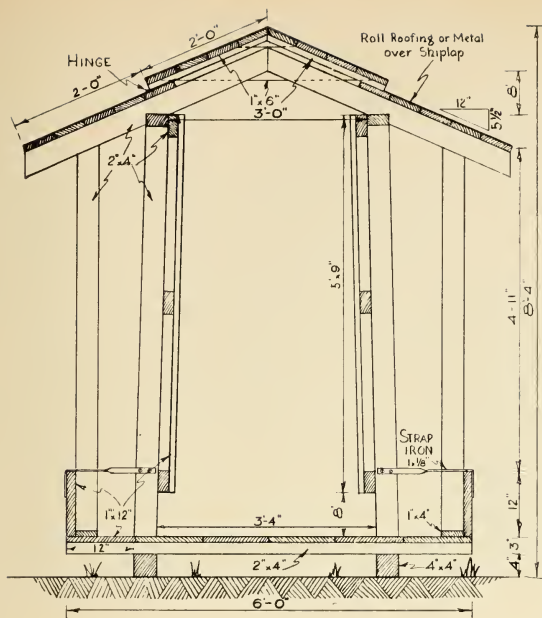
Self-feeding of chopped hay and grain mixtures requires that the sides of the feeder have a slight slope or "batter" to the outside, as illustrated at top of page 21. The sides slope outward from a width of 3'-0" at the top to 3'-4" at

the bottom. The side boards are run vertically so as to present a smooth surface to the hay. The capacity of this feeder is 18 cubic feet per foot of feeder, or (if the feed mixture weighs 10 lbs. per cubic foot) 180 lbs. per foot. A feeder 8 feet long will hold 1,400 lbs. of hay and grain mixture. Allow 1 foot of space at this feeder for each animal.

Self-feeders for creep-feeding calves are usually placed near the water or other places where cattle congregate. The type of feeder illustrated on page 22 does not require any fencing. This plan was prepared by William King, Farm Advisor of Kern County, California. Calves are usually allowed access to creep-feeders while they are nursing their mothers. This practice is followed when the feed supply is limited or when such calves are to be fattened at an early age to be marketed at about 900 pounds.

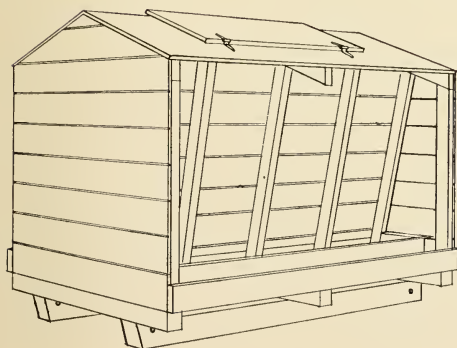
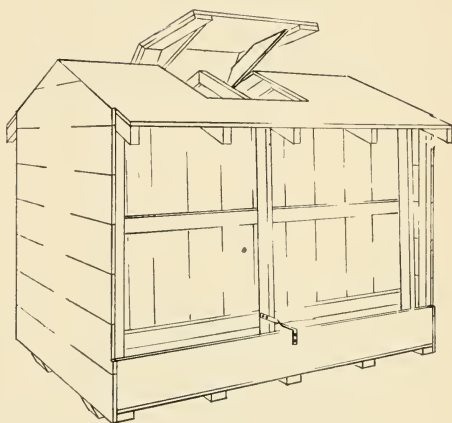


Cross section of a self-feeder for salt and cottonseed meal supplement. Made on skids for portability.

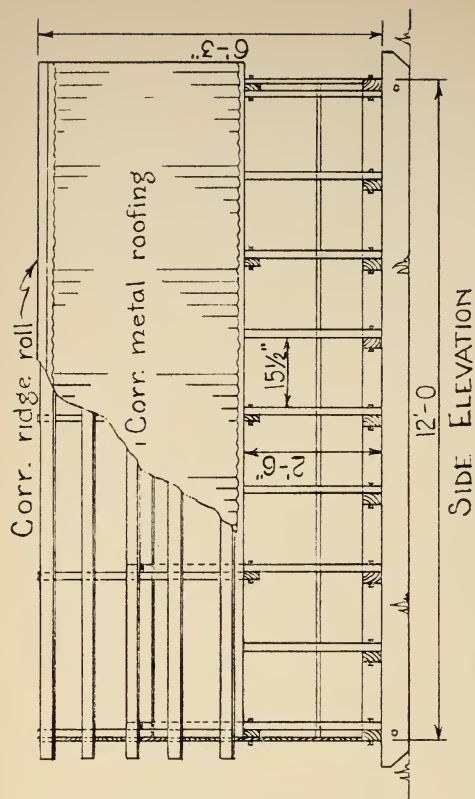


Self-feeder for chopped hay and grain. Note that the sides are four inches farther apart at bottom than at top, to prevent bridging.

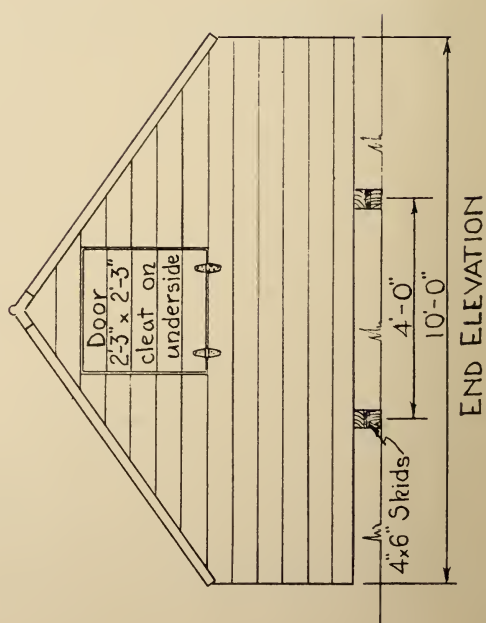
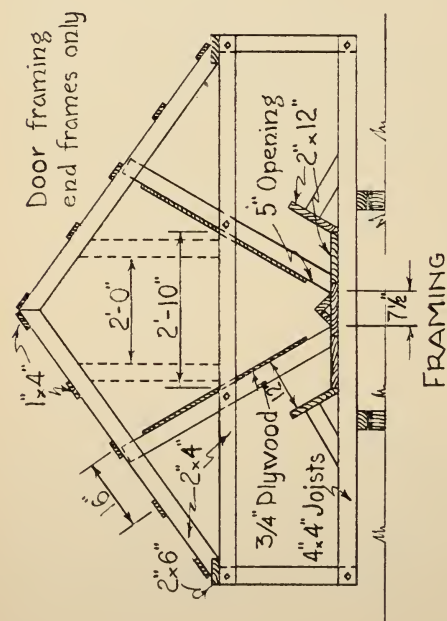
Perspective view of the self-feeder shown above.



Perspective view of the self-feeder shown on page 20, but with 6 x 6" skids instead of unfinished logs.



This self-feeding creep feeder for calves is mounted on skids.
It is a complete unit, yet is readily portable. The bin holds about
1,000 pounds of feed concentrates.





Here are two efficient pieces of equipment that may be used for (top) picking up chopped green material from the field, and (bottom) distributing it to the feed yard.



There are several ways to feed molasses

The use of molasses as a livestock feed is increasing. It is estimated that between 50 and 100 million gallons are fed annually to livestock. It is a very palatable feed and contains about 70 per cent as much total digestible nutrients as does barley. During the past several years, molasses has been an economical feed compared to other concentrates of equal value. Because of its palatability it is especially valuable when used on less palatable feeds for inducing livestock to consume large quantities.

(1) Among the several ways in which molasses can be fed to livestock, feeding it free choice in open troughs is quite a common practice. If the molasses drum can be placed in the trough with the plug out and the open hole down, it will serve as a self-feeder. In order to prevent the cattle from smearing themselves with the feed and thereby wasting the molasses, some growers place a light-weight slatted cover in the trough which floats on the surface of the molasses.

(2) Another molasses self-feeder that has been found practical is a navy pontoon tank. This tank is 5 feet wide, 7 feet long, and 7 feet high. It is supported on

a platform approximately 30" from the ground. Constructed on 4 sides of this tank are small metal troughs, oval in shape and about 6" deep. A 4' roller is constructed through the center of each trough. Baffleboards are placed from the edge of the trough to within about 1" from the roller.

Molasses is supplied to the troughs through a float valve similar to that used in watering troughs, and cattle secure the molasses by licking the roller. This type of molasses self-feeder (shown at the bottom of this page) can be bought on the market, or can be built on the ranch. (Ask your Farm Advisor or the Agricultural Extension Service for Plan C-29.)

(3) Where small numbers of livestock are being fed molasses, it can be poured or sprayed on the feed. When molasses is fed in this way, it is diluted with water at the rate of about 1 gallon of water to 2 of molasses. Rigs used for spraying cattle or controlling weeds can be used for spraying molasses on the feed *after thorough cleaning*. In some of the larger feed lots special tanks placed on trucks and equipped with a spray boom are used for feeding of molasses.



A molasses self-feeder constructed around a surplus Navy pontoon tank, by Mr. Stanley Cahoon, Soledad, California.

(4) Probably the most common method of feeding molasses is to mix it with the feed. This requires more labor and equipment than any of the other methods mentioned. It is best to use the molasses-mixed feed within a few days after mixing, since there is a tendency for feeds of this kind to cake when stored for any length of time. If such feeds are stored, feed should be dry and contain not more than 15 per cent molasses.

The most common type of continuous mixer consists of a large trough in which

revolve one or two shafts carrying teeth, arms, or auger flights. The dry feed and molasses are poured into one end and are mixed as they pass along the trough and flow out the other end. Mixing can also be accomplished by running the molasses into the blower of a grinder or chopper. A feed mix of more than 15 per cent molasses should never be attempted in hammer mills or blowers. Molasses viscosity may be reduced by adding water. This should never be done if feed is to be stored for any length of time.

Provide drinking water at all times

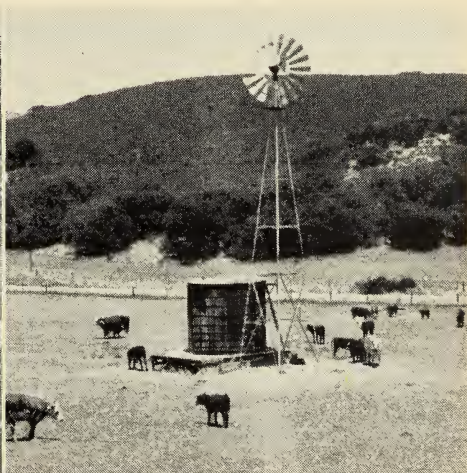
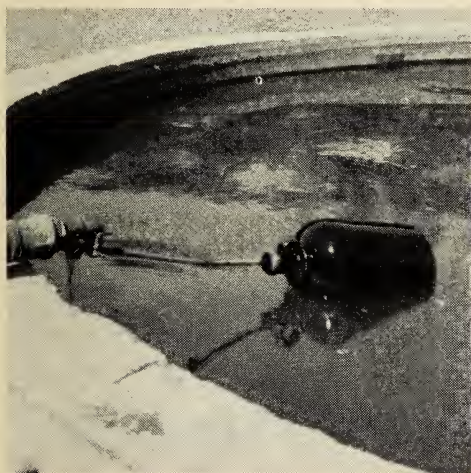
Good, clean, fresh water should be provided in feed corrals at all times. Place the trough so that it can serve at least 2 corrals. Good troughs are usually about 16 feet long and 3 feet wide. Oval-shaped bottoms are desirable for cleaning and draining the trough. Floats insure a continuous supply of water.

A float constructed of a gallon glass jug attached to a commercial shut-off valve by means of a $\frac{1}{8}$ " pipe is shown in the photo below. Threads to fit a $\frac{1}{8}$ "-pipe coupling are cut on the fulcrum of

the valve base. The other end of the pipe (15-18" long) is fastened to the jug with lock nuts.

Cattle on feed in most parts of California will drink between 10 and 12 gallons of water per head per day. In the hot interior valleys the amount may reach 15 gallons per head per day. If drinking water is kept to a temperature under 70° cattle may gain more satisfactorily.

A plan for a 20-foot tower to support a 5,000-gallon circular tank is available through your Farm Advisor's office.



A concrete watering trough, with ranch-made float. Right. Water storage tank and windmill using natural slope to fill trough.

Build barns large enough

Barns must be large enough to hold the amount of feed necessary for the number of animals to be fed through the period. The interior arrangement should be such that they can be cleaned out easily. Beef cattle do not require a warm shelter, but it is desirable to protect them from cold rains, snow, and wind. Complete working plans for the construction of four different types of feed and shelter barns are available from your Farm Advisor or from the Agricultural Extension Service (see page 33).

A cross section of Plan No. C-136 is shown below. This barn has a gable roof, the hay mow space down the center of the building being 24' wide and 20' high to the plates. A 6' feed alley (including manger) extends along each side of the hay storage the full length of the barn. Sheds 14' deep to the manger curb, with a low overhanging eave, closed ends, and sides entirely open, prevent rain being driven very far into the interior, and dry out readily.

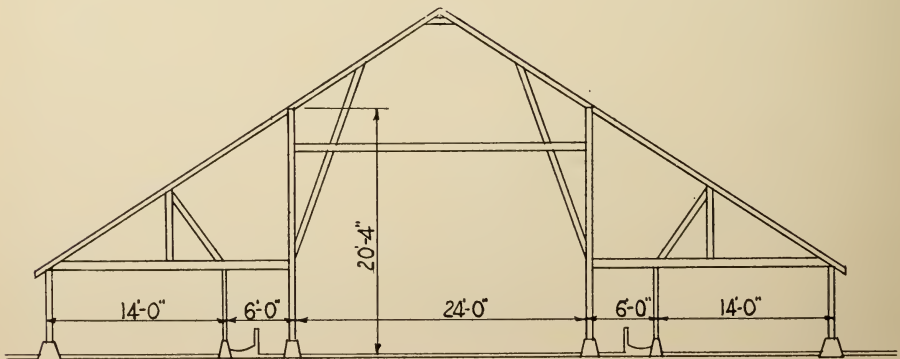
The barn shown at the top of page 27 is similar to the one in Plan 136 except for the type of roof. The monitor-roof type brings the shed roofs a few feet lower and cuts down on the mow space above the cattle-shelter shed. Full details of construction are shown in Plan No. C-137.

The plans show wooden lock stanchions, but a V-opening feed rack may be substituted.

Chopped hay, being more "fluid" than long hay, exerts a greater pressure on the walls. Plan No. 138 (bottom of page 27) has sloping or "battered" sidewall posts along the mow, to relieve them of lateral pressure as the chopped hay settles. A small blower pipe opening in the peak of the gable substitutes for the usual hay doors.

The three barn plans just described all have open sheds on the sides for cattle shelter. They can be cleaned with mechanical equipment on tractors, but they have the disadvantage that the supporting posts on the outside must be worked around. A design for a feed and shelter barn, having the shelter-shed roof cantilevered out from the side of the hay storage without the use of supporting posts is shown on page 28.

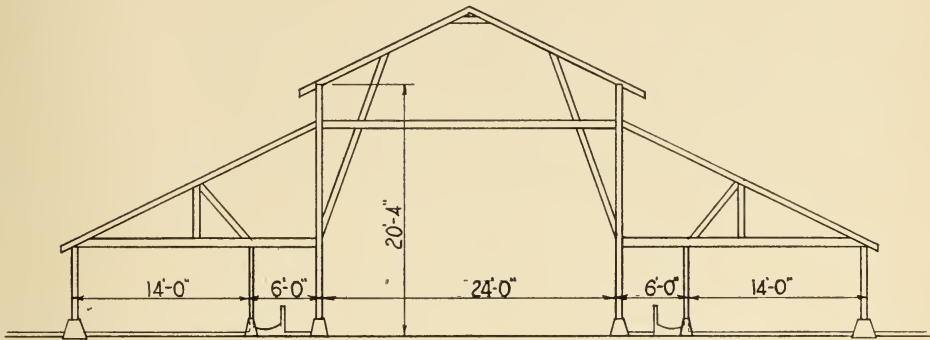
An area 12 feet wide outside of the manger is paved with concrete. This allows animals to pass around behind those standing at the manger. The paved area, because of the absence of posts, can be scraped clean quickly with a blade on the front of a light tractor, and the 4" curb assures positive drainage to one or either end. This is Plan No. C-225.



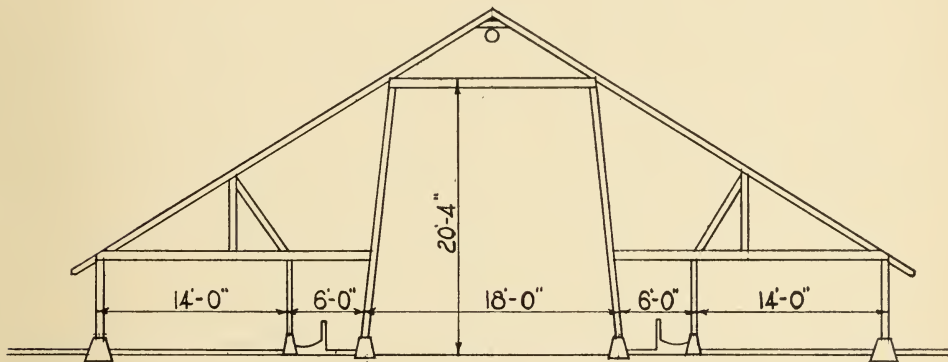
A gable-roof barn (Plan C-136) showing hay storage manger locations.

The cantilever method of constructing shelter sheds has the advantage of being easily cleaned, with no posts to interfere with equipment or injure cattle. Details of cantilever construction for chopped-hay barns are shown in the two drawings at the bottom of pages 28 and 29. This

type of roof is not designed for areas with heavy snowfall because of the greater load. For the same reason it is better to cover the shed with some type of metal roofing rather than heavier sheathing and shingles. Cantilever-type barns are increasing in popularity in California.



A feed and shelter barn (Plan C-137) with monitor roof.



A feed and shelter barn (Plan C-138) especially designed for chopped hay. Sloping the side posts along mow relieves them of pressure when the hay settles.

NOTE: Plans for a cantilever-type shelter shed are given on the following page.



CAPACITIES OF FEED BARN

Before building, consider the amount of hay storage necessary to see the animals through the feeding period. The size of the barn will depend upon the number of animals, the months of the feeding period, amount fed per day, and density or weight per cubic foot of the hay. The latter will depend upon whether the hay is loose, baled, or chopped; how long it has been in storage; and what the depth is.

The table below gives the capacity of each of the four barn plans just discussed **per foot of barn length**, for long, baled, and chopped hay. An average figure for the density of loose hay has been taken as 4 lbs. per cubic foot, for baled hay as 10 lbs., and for chopped hay as 12 lbs. per cubic foot (500, 200, and 170 cu. ft. per ton, respectively).

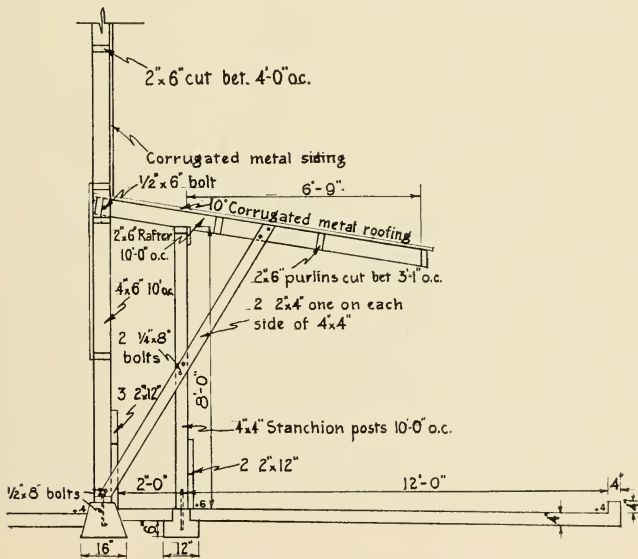
Two and one-half feet of manger per animal is usually considered enough for dehorned beef cattle. Thus, with shelter barns and mangers on either side of the feed barns, each two animals will have in front of them 2½ feet of hay storage, or 1¼ foot per animal.

The capacities given below for hay, divided by the daily amount fed per animal, and multiplied by 1¼, will give directly the number of days' feed that can be stored. For instance, if 30 lbs. per day is fed per animal, Plan. No. C-138 will provide 158 days' feed when chopped hay is fed, $\frac{(1.9 \times 2,000 \times 1.25)}{30}$,

and only 58 days if long hay is stored, $\frac{(.7 \times 2,000 \times 1.25)}{30}$.

Capacity per Foot of Barn Length

	Barn Plan No.			
	C-136	C-137	C-138	C-225
Volume (cu. ft./foot of barn length).....	480	480	320	512
Capacity (ton/foot of barn length)				
Long hay	1.0	1.0	0.7	1.0
Baled hay	2.5	2.5	1.5	2.5
Chopped hay.....	2.8	2.8	1.9	3.0



... on a feed barn with vertical walls.

A well-drained trench silo

With the introduction of better varieties of corn and of various other silage plants, the use of silage is each year becoming more popular in California. Hay can be replaced by silage at the ratio of 3 lbs. of silage to 1 lb. of hay. Recent tests indicate that cattle can be successfully fattened with silage as the sole source of roughage.

Trench silos provide economical storage for the feeder if suitable precautions for drainage are taken and the silage is adequately packed while trenches are being filled. This type of silo is well adapted to the use of a field harvester, since the trucks of cut feed can be emptied by false bottoms or cables hitched to a post in the ground, and a blower is not needed at the trench. A trailer of the type shown on page 23 can be used for this purpose.

Dig the silo on the side of a hill if possible. Ditches should be placed in the hill above the silo to divert surface water. Some users construct a tile line down the

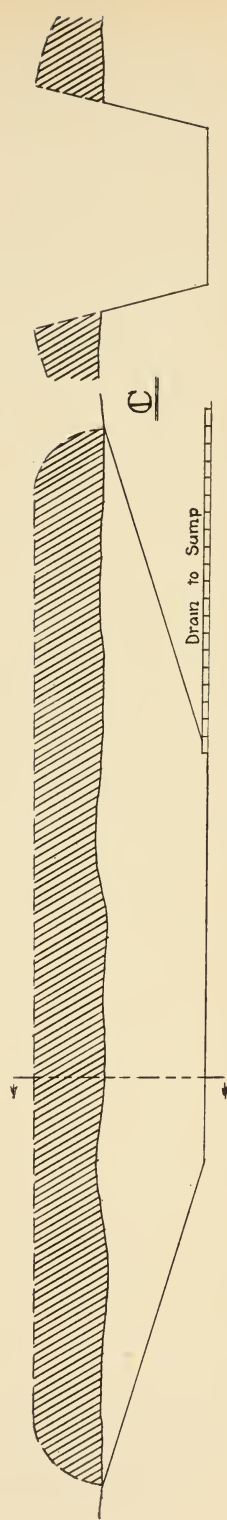
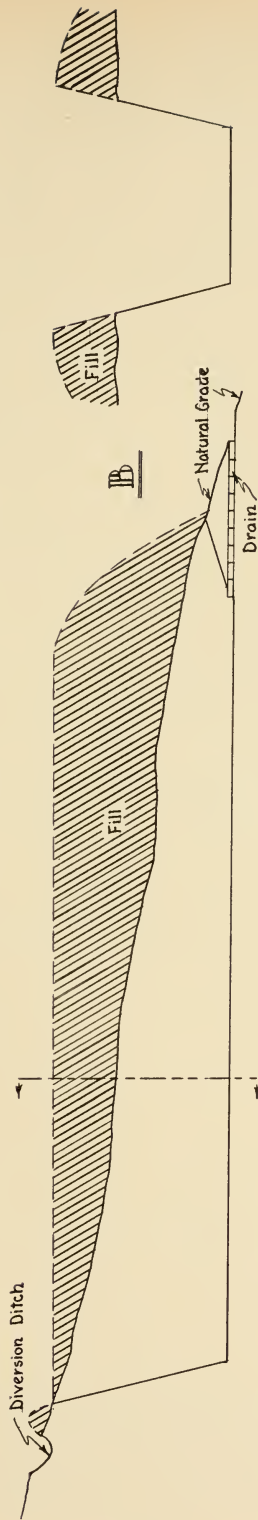
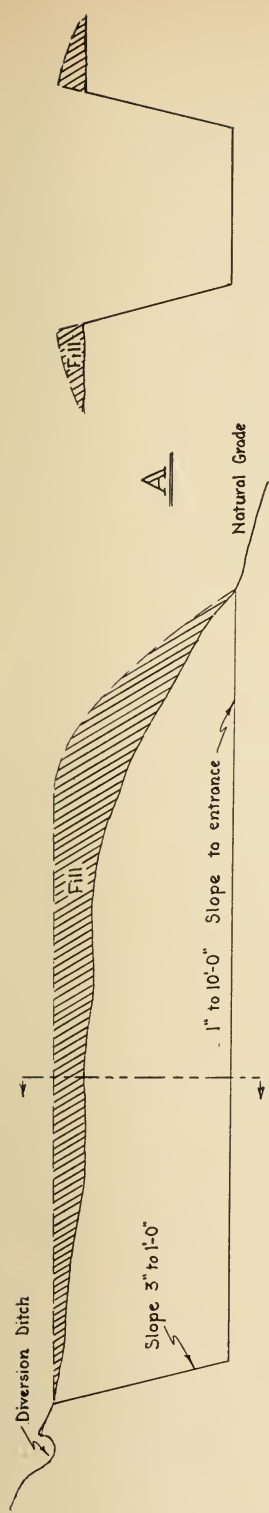
center of the trench bottom to carry away surplus juices to a dry well, open drainage ditch, or sump. A trench silo constructed on level ground is shown at the bottom of this page.

In the sketches on the opposite page three general layouts for trench silos are shown, including the three most usual conditions of grade slope. The sides should be sloped inward from 3 to 5 inches per foot of depth. Capacities of trenches of various depths and cross-sectional area are given in University of California Circular 411, "Silage, Silage Crops, and Silos," obtainable from your local Farm Advisor or through the Agricultural Publications office.

Corn silage, if well packed, will weigh between 30 and 40 lbs. per cubic foot, 35 lbs. usually being assumed. If the ground-water level will allow a depth of 10 feet, a capacity of $11\frac{1}{2}$ tons per foot of trench may be obtained with a top width of 11 feet, bottom width of 6 feet, and side slope inward of 3 inches per



A trench silo partially filled with almond hull silage. This trench is 30' x 175' x 11' and is located on the Roney Brothers Ranch, in Butte County, California.



Three possible arrangements of trench silos. A—on a hillside. B—on a gentle slope. C—on level ground.

foot. However, some locations may not allow such a depth because of a higher water table, and some soils may not stand up at this slope. Each location and condition presents its own problems for solution.

In general, the bottom of the trench should slope about 1" per 5 feet toward the outlet (if on a hillside) or toward the inlet to the drain tile. If more convenient, this can be placed in the center of the trench. When natural drainage is not available, the tile may be emptied into a sump and be pumped out to a surface-drainage ditch. The earth removed from the trench may be banked up beside the silo to form part of the walls. It should be packed well before filling and, to allow for complete settlement, should not be lined until the second year. Either concrete or wood may be used for lining if desired, although trenches have been used for years in some areas with only a scraping down of the earth walls before filling each year.

A cement plaster, 2 or 3 inches thick, makes a good lining for firm soil. Apply a plaster of 1 part cement, 3 parts sand,

and 3 parts pea gravel, over wire mesh held to the wall with spikes. Planks set vertically may also be used. Horizontal nailing rails of 4" x 4"s should be let into the sides of the trench, about 4 feet apart. A larger timber would be better for the upper plate.

Roofs are not generally necessary for trench silos in California. Good practice is to fill the silo 3 or 4 feet above the top of the trench, packing each load with a tractor, allow to settle overnight, and then refill to the same level with more silage. The silage can then be overlaid with heavy kraft paper and covered with several inches of earth to keep out air. Some feeders cover the silage with several inches of straw, chaff, or other material, wet it down, and seed barley. The roots of the sprouted barley make a firm and fairly air-tight cover.

If a truck is going to be used for emptying the silo, it should be recognized that the bottom of the trench may be very muddy. It may be more convenient to lay down planks or other surfacing material on the trench bottom before filling than during emptying.

In order that the information in our publications may be more intelligible it is sometimes necessary to use trade names of products or equipment rather than complicated descriptive or chemical identifications. In so doing it is unavoidable in some cases that similar products which are on the market under other trade names may not be cited. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.

YOU CAN GET ANY OF THESE PLANS THROUGH YOUR FARM ADVISOR

or order from Public Service, Agricultural Extension Service, University of California,
121 Giannini Hall, Berkeley 4, California

No.		Price
C-29	Molasses self feeder.....	\$.40
B-77	Stockyard gate—12'-6" wide, 6'-0" high. 2" x 6" and 1" x 6" rails. Adequately braced latch for operating from horseback	.15
C-82	Farm water tower.....	.25
B-99	Farm gate hinge—heavy hinge which can be constructed of mild steel in the farm shop.....	.15
C-136	Feed barn with gable roof.....	.75
C-137	Feed barn with monitor roof.....	.75
C-138	Feed barn for chopped hay.....	.75
C-139	Shelter shed, no feed storage.....	.40
C-148	Cattle stocks—animal is held by wooden neck stock and canvas sling wound up on side rollers.....	.25
C-184	Cattle dipping vat—slightly larger than the plan shown on page 12. Detail of parting gate and drain pens included....	.15
C-225	Feed barn for chopped hay, cantilever shed.....	1.00
C-201	Nevada calf table and squeeze—A combination squeeze and operating table. Table tips to horizontal position. Wood construction25
Ex-5465	Nevada dehorning chute—a heavy, rugged squeeze, using 8" x 8" posts for the frame and 2" pipe for both sides of squeeze. Adjustable head stock.....	.25

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and this is what it looks like . . .

THE PHOTO above is taken from a circular on irrigated pastures in California. It shows a good layout of fences and gates for rotation grazing.

The drawing below is from a circular on selective weed killers and shows one reason why some weed killers are selective.

These pictures are typical of the practical, down-to-earth approach

to farm problems used in many of the free publications put out by the University of California College of Agriculture.

In editing these publications, the rule is, tell it simply; if it can't be told simply, use a photograph; if a photograph won't show it, draw a picture.

The publications cover a wide variety of farm subjects, and their aim is to present useful information developed by the University's specialists, in a clear, easy-to-read manner.

Perhaps one or more of these publications will help YOU with your farm problems. For a catalog listing all of the publications available, see your County Farm Advisor or write to:



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